## 1.2    Overview of MIL-HDBK-1530 ASIP Guidance

Overall guidance for the Aircraft Structural Integrity Program (ASIP) is contained in MIL-HDBK-1530. This program for ensuring the structural integrity of an aircraft system throughout its design life is based on the damage tolerance philosophy and provides a series of time related tasks from initial design through the operational life of a fleet. According to Lincoln [2000], "The introduction of damage tolerance principles by the USAF in their structural inspection program in the early seventies virtually eliminated fatigue as a safety issue in their aircraft."

The objectives of ASIP are to:

a) Establish, evaluate, and substantiate the structural integrity (airframe strength, rigidity, damage tolerance, and durability) of the airplane.

b) Acquire, evaluate, and utilize operational usage data to provide a continual assessment of the in-service integrity of individual airplanes.

c) Provide a basis for determining logistics and force planning requirements (maintenance, inspections, supplies, rotation of airplanes, system phase-out, and future force structure).

d) Provide a basis to improve structural criteria and methods of design, evaluation, and substantiation of future systems.

These objectives are met through five time-phased tasks that cover the structural design, development, and management of an aircraft structure. The ASIP tasks with major elements are presented in Table 1.2.1 from MIL-HDBK-1530. The first three tasks are concerned with the development of the ASIP Master Plan for the structure and the design information, design analyses, development tests, and full scale tests. The last two tasks list the recommended procedures for ensuring damage tolerance and durability of individual aircraft during fleet operations of the weapon system. These latter tasks are defined as force management and are an integral part of the ASIP Master Plan.

The Force Structural Maintenance Plan of Task IV of ASIP is the basis for the estimation of the maintenance costs that the fleet will incur during the period of its design service life. The timing of maintenance actions is based on predicted crack growth in the design load and environmental stress spectrum.  Deviations due to individual aircraft usage are accounted for by the tracking program of Task V. However, as an aircraft ages, the force structural maintenance plan may have to be modified due to unanticipated usage, widespread fatigue cracking, corrosion, or accidental damage. Inspection schedules may also require changes due to extending airframe life beyond initial life goals.

The process of maintaining aging aircraft in an operational state is known as sustainment. This topic is addressed in Subsection 1.4.

**Table 1.2.1.** ASIP Tasks from MIL-HDBK-1530

| Task I | Task II | Task III | Task IV | Task V |
|---|---|---|---|---|
| Design Information | Design Analysis and Development Tests | Full Scale Testing | Force Management Data Package | Force Management |
| ASIP Master Plan | Materials and Joint Allowables | Static Tests | Final Analyses | Loads/Environment |
| Structural Design Criteria | Loads Analyses | Durability Tests | Strength Summary | Spectra Survey |
| Damage Tolerance & Durability Control Process | Design Service Loads Spectra | Damage Tolerance Tests | Force Structural Maintenance Plan | Individual Air Vehicle Tracking Data |
| Selection of Materials, Processes & Joining Methods | Design Chemical/Thermal Environment Spectra | Flight & Ground Operations Tests | Loads/Environment Spectra Survey | Individual Air Vehicle Maintenance Times |
| Design Service Goal and Design Usage | Stress Analysis | Aeroacoustic Tests | Individual Air Vehicle Tracking Program | Structural Maintenance Records |
| Mass Properties | Damage Tolerance Analysis | Flight Vibration Tests | | Weight and Balance Records |
| | Durability Analysis | Flutter Tests | | |
| | Aeroacoustics Analysis | Interpretation & Evaluation of Test Results | | |
| | Vibration Analysis | Weight & Balance Testing | | |
| | Flutter Analysis | | | |
| | Effects Analysis Nuclear Weapons | | | |
| | Effects Analysis Non- Nuclear | | | |
| | Weapon Effects Analysis | | | |
| | Design Development Tests | | | |
| | Mass Properties Analysis | | | |